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Patent Application

February 6, 1975
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Air sterilization and purification apparatus
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Commissioner of Japan Patent Office:
1. Title of the Invention:
2. Inventor:
 Domicile:
3. Applicant:
 Domicile:
4. Agent:
 Domicile:
5. List of Appended Documents
 (1) Specification
 (2) Drawings
 (3) Duplicate Copy of Application
 (4) Power of Attorney
 (5) Request for Examination

1 set
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1 set
1 set Method Examination
1 set

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Specification

1. Name of the Invention: Air Sterilization and Purification Apparatus

2. Scope of Patent Claims

In an air purification apparatus that passes positively charged airborne dust between opposing electrodes, an air sterilization and purification apparatus wherein air is caused to pass through while inducing a separation phenomenon by switching the direction of flow of air that passes through the aforementioned opposing electrodes and modifying a cross section of the passage.

3. Detailed Description of the Invention

The invention of the present application is one that relates to an air sterilization and purification apparatus, and in a purification device that causes airborne dust particles to be absorbed by static electricity, relates to a device capable of raising dust removal effectiveness, and is intended to achieve an air sterilization and purification apparatus that, in particular, is made up of a combination of novel and ever simpler elements, is manufactured by a simple process with lower costs of production, and that, with excellent safety, is capable of achieving even better results in use.

Along with the development of heavy industry, air pollution from sources at each stage of the production process, nitrous oxide and sulfur dioxide emitted from transportation sources, and heavy metal particulates, have steadily increased. The widespread expansion of pollution has become an issue of serious concern to society, and various regulations have been proposed to prevent pollution, including preventing the generation of toxic materials as well as the strengthening of emissions standards. These approaches, however, cannot be considered adequate, and there are a growing number of people who suffer from lung cancer and other cancers as well as an increase in the number of people suffering from asthma. Air purifiers have become a common and indispensable part of life and are to be found installed in homes and sickrooms to prevent and/or treat these illnesses, and are used as prevention or treatment devices in the production stages of sanitary pharmaceuticals, foods, devices, and are also employed in the production of precision machinery.

A variety of devices have been suggested to cleanse the air by removing airborne toxic materials. Among those are air purifiers that use filter materials in air flow passageways to physically collect the dust, or electrical air purification devices such as dust removers that make use of static electricity or infrared rays to disinfect the air, or a combination of any of these approaches in order to remove toxic materials.

Among these, suggestions for conventional devices based on the aforementioned use of static electricity are known, including, for example, (a) an approach utilizing centrifugal force designed such that air, induced from an air inlet, passes through an ionization element while electrical voltage is applied to the inner and outer cylinders while the inner cylinder rotates, moving the air between the inner and outer cylinders, and (b) an approach where, in the above configuration, the outer circumference of an inner cylinder has inclined guide vanes provided in the axial direction along the outer circumference of the inner cylinder and rotational movement is applied to the air as it passes through between the inner and outer cylinders to make use of centrifugal force.

The above mentioned approaches have attempted combined dust collection by the use of electrostatic migration and centrifugal force, however, because high voltages with 11 KV in between the inner and outer cylinders, and as a result of rotating the induced air, a rectified electricity may be generated due to frictional resistance depending upon the air flow rate, and electric discharge sparks may occur between the dust particles that have collected onto the external cylinder, frequently causing risk of electrocution as well as the increased production of ozone and possible malfunction of the device.

In view of the above, research conducted by the inventors of the present application have overcome and eliminated the well known defects described above, and have perfected a device that is superior in terms of safety and that markedly increases the efficiency with which dust is adsorbed. The invention comprises a fan motor; an inner cylindrical electrode that has a

built-in high-voltage transformer, and that is connected to the positive side; a high voltage cap connected to the negative side; an external cylindrical electrode that is earthed; and a housing that has openings on both sides, and that is supported by a pedestal. On occasion that airborne dust that is guided into the unit through the upper inlet passes through an ionization section high-voltage cap that is connected on the negative side, a positive charge is applied to the dust, and it is guided into the electrostatic field between the grounded outer cylindrical electrode and the positive inner cylindrical electrode, and as a result of the electrostatic induction effect, airborne dust passing through is adsorbed onto the surface of the outer cylindrical electrode. Thus, the present invention is characterized by having opposing electrodes that have a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed curved surfaces on the inner cylinder and an outer cylinder provided with a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed surfaces, wherein the convex curved surfaces or recessed surfaces of the inner cylinder and the convex surfaces or recessed surfaces of the outer cylinder alternate with each other. By creating an electrostatic field between these opposing cylinders, the direction of the flow of air passing through them can be altered, and the flow passageway cross section can be altered so that the flow rate fluctuates, thereby creating a flow separation phenomenon. This causes the generation of a stagnant flow, a reverse flow, or a turbulent flow of air that contains dust. The intention here is to extend the duration of the effect of the electrostatic adsorption on the outer cylindrical electrode surface and to increase in the efficiency of dust removal. The next object of this invention is to provide a device with superior safety. Additionally, an object of the invention is to provide a simple and compact mechanism that can be made available at low cost and that can be placed easily in a variety of locations, as well as to provide a device that allows simple, easy, and safe cleaning of the panel upon which the dust has been adsorbed. Other objects and characteristics of the present invention can be understood from the following explanation.

In Figs. 1 through 5, a housing acceptor cylinder (5) is supported on a stand (1) by means of a shaft (2) upon which a support board (4) consisting of insulating material and provided with exhaust windows (3); an external cylinder accepting cylinder (7) is mounted on the edge of the lower opening section of said housing; an exhaust windows (6) is arranged in the external cylinder barrel (7); and a fan motor (8) is internally installed in a motor cap (9). The fan motor (8) (for practical purposes, preferably with a maximum torque of $1040 \pm 10\%$) is connected to a power source, and the motor cap (9) has a built-in high-voltage transformer (11) that is connected to a power source. An inner tube electrode (14) made of metal and provided with stepwise alternating vertical curved surfaces (12) and convex curved surfaces (13) is installed onto the positive side of the high-voltage transformer, and a rounded-head inner cap (16) made of insulating material and continuing the multiple outer cylinder support [illegible] (15), (15) is mounted in the top opening of this inner cylindrical electrode (14). A metallic high voltage cap (18) that is provided with a limit switch (17) is installed in this cap (16) and connected to the negative side of the high-voltage transformer and a metallic outer cylindrical electrode (22) provided with stepwise alternating vertical curved surfaces (20) and recessed curved surfaces (21) on the upper opening edge step section (19) of the outer cylinder acceptor (7). The vertical arced surfaces (20) and the recessed arced surfaces (21) are positioned so as to face the swelling arced surfaces (12) on the inner cylindrical electrode (14) and the vertical arced surfaces (12) on the inner cylindrical electrode (14) with each other, respectively. The external cylindrical electrode (22) faces the inner cylindrical electrode (14). According to FIG. 1, an air inlet window (23) is arranged in the upper opening of the external cylindrical electrode (22), and a retainer plate (25) made of insulating material is provided on the bottom limit switch retainer element (24). Next,

the housing (27) is installed on the upper opening of the outer perimeter section (26) of the housing acceptor cylinder (5), which is installed on the support board (4). A head section retaining cylinder (28) is installed at the top section of this opening, and an air inlet window (29) is provided in this upper opening and a connector board (31) made of insulating material and provided with dust-proof mesh/screen (30) that is connected by means of bolts (32) to the retainer plate (25), air inlet windows (29), and air inlet windows (23), and is configured so that air passes between the inner and outer electrodes, the exhaust windows (6), and the exhaust windows (3), and is circulated to the outside when the fan motor (8) is operating.

At this time, when the high voltage transformer (11) and power source are connected by a switch, which is separately arranged (in practical terms, an input voltage of 100 V AC and output voltage of 7 KV DC are preferable) the airborne dust that is introduced [into the unit] is positively charged in the vicinity of the transformer (11), by the inner cylindrical electrode (14) that has been connected to the positive side by means of the electrostatic induction between the inner and outer electrodes, and is migrated to the external cylindrical electrodes (22) and clung to its walls.

Here, the direction of the air flow that is passing through the convex curved surfaces (12) and vertical curved surfaces (13) provided on the inner cylindrical electrode (14) is switched by the vertical curved surfaces (20) and recessed curved surfaces (21) provided on the outer cylindrical electrodes (22), and as a result of the change in the cross section layer between these electrodes, the spacing between the vertical curved surfaces (12), (20) of both electrodes should be approximately 20 mm; the spacing between the vertical curved surfaces (21) on the outer cylindrical electrodes (22) and the convex surfaces (13) on the inner cylindrical electrodes (14) should be approximately 16 mm; and the spacing between the recessed curved surfaces (21) on the outer cylindrical electrodes (22) and the vertical curved surfaces (12) on the inner cylindrical electrode (14) should be approximately 25 mm, for practical purposes. The recessed curved surfaces (21) should be 5 mm in diameter, while the convex curved surfaces (13) should be 4 mm in diameter. There is a change in flow rate, and the separation phenomenon is augmented. As a result, the dust-bearing air flow stagnates, reverses or becomes turbulent, thereby extending the duration for electrostatic adsorption and increasing dust collection efficiency (Fig. 6).

In the cross sectional configuration of the above mentioned both electrodes described above, in another embodiment, the convex curved surfaces (13) of the inner cylindrical electrodes (14) could have a gentle linear flow [illegible] convex curved surfaces (13) on the upstream side to intensify the switching of the direction of flow and the change in the flow passageway cross section, making it that much easier for the separation phenomenon to occur, forming lead (33) between the convex curved surfaces (13), (13) for a configuration that augments electrostatic induction. (Fig. 7)

Moreover, as a separate embodiment, convex curved surfaces (34) with gentle flow lines are formed on the upstream side of the outer cylindrical electrodes (22), and both flow line convex curved surfaces (34) and flow line convex curved surfaces (35) are positioned so they oppose one another, thereby intensifying the switching of the direction of flow and the change in the flow passageway cross section, extending the duration in which adsorption occurs due to stagnation, reverse flow, and turbulent flow of the dust-containing air (Fig. 8).

With regard to removal of dust clung onto the surfaces of the outer cylindrical electrodes, the power to electrode (22) is removed along with the retainer plate (25) by removing the connector board (31) and by pulling up and removing the head section retaining cylinder (28) and the housing (27), and after cleaning these, it is easy to restore them to their original state and join together. At this time, the retainer element (24) of the retainer plate (25) is separated from the limit switch

(17), thereby breaking off the flow of current between the high-voltage transformer (11) and the power source, so that there is no risk of electrocution.

As configured above, the present invention extends the duration of the cling effect on the outer cylindrical electrode by means of electrostatic induction of the dust-carrying air that passes between the electrodes, thereby increasing the efficiency of dust removal and reducing mold spores and yeast fungus.

Moreover, this is a particularly safe device since there is no danger that frictional force and resulting rectified electricity will be generated as a result of centrifugal force as the air passes through the unit, and the risk of malfunction due to sparking electric discharge between the adsorbed dust particles resulting in electrocution or explosion can be prevented, and the generation of ozone can be suppressed.

Also, given the device's simple and compact configuration, it can be manufactured less expensively, and it is also easy to move.

4. Brief Description of the Drawings

Figure 1 is a front view. Figure 2 is a plan view. Figure 3 is a view of the bottom surface. Figure 4 is a cross-sectional view along the A-A line in Figure 1. Figure 5 is a cross-sectional view along the B-B line in Figure 1. Figure 6 is an enlarged view of the area indicated by the letter E in Figure 4. Figure 7 is an enlarged flow line cross section diagram of another embodiment. Figure 8 is an enlarged flow line cross section diagram of yet another embodiment.

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Agent: Hiraki MIURA [seal]

特許願

新嘉坡華人政府		新嘉坡華人政府	新嘉坡華人政府	新嘉坡華人政府
1.	美明の名林	新嘉坡華人政府	新嘉坡華人政府	新嘉坡華人政府
2.	英國者	新嘉坡華人政府	新嘉坡華人政府	新嘉坡華人政府
3.	特許證照人	新嘉坡華人政府	新嘉坡華人政府	新嘉坡華人政府
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5.	送回郵局	(1) 明瑞青	1 通	新嘉坡華人政府
		(2) 胡	1 通	新嘉坡華人政府
		(3) 胡金深大	1 通	新嘉坡華人政府
		胡金深大	2 通	新嘉坡華人政府

50 *oicosa*

三、物种的名称 空斑长尾斑潜蝇
三、物种学的特征

五の事件をねえられた事は今の人間にんぞ。内閣は元老院を通過せむる所にしたるが如きは、實に少いて、上院が可する議案院を通過する事は、必ず万能な権利者で、本口は即ち新御室主の御名をセるととによつて、御親承を附してセキテ、立候を許すをしめようじにしたこととを可與とする御承認等が既成。

三、電動機的選用

次第の範囲は、空気純度を決定せしめ、更に
中のよんじんを対応に上り落葉せしめる量が成
長に付いて、その助長效果を被けることのできる
植物に附し、とくに成長で一層風向を充満する所
からなり。雨季で土壌とより多い空気を供給せし
められ、ふつぶつ株に死れ、より良い使用料を
得るなどのできる化其の結果を特徴とする
ものである。

新民主主义时期民族资产阶级——民族资产阶级

⑩ 日本国特許庁
公開特許公報

①特開昭 51-90077
②公開日 昭51(1976)8.6
③特許庁番号 4,0-16080
④出願日 昭50(1975).2.6
検索請求 有 (全5頁)
内閣文庫
7023 41

④日本分類
72 C4
⑤Int Cl:
B03C 4/48P

て現れさせれる大太鼓は大根ねこエジソンが最初に考案して
町田さるも又完成をした。いこう吸気管とくぐれ子
供の足を床元まで運ぶ吸氣の吸気は子供が走る
し。五歩おいて吸氣をとむとよりは公道が開拓をして
て大きくなり上げられてより、大太の力が開拓について
ついで種々の公道が整備された。有留地区の男生の
子供たちは皆お出で本校が開校されば大太をセイ尤
カといひ立て、大太開拓に工る西原さんとの他の男
の娘の父は西原さんは女とくち方本校の教諭である。此
故西原さんは、土木開拓の字前上大は西原上校現
在は西原さんといはれ常に監督し、子供、西原開拓
として現いは西原上校屋、西原、西原家の姓を
表すかとて名を西原、西原は西原の姓を
いて奉りし、夫婦上不可欠の御用とせつた。

七七八、二九四年的夏天和秋天在神户和大阪度过了。大半年的期间被两个城市包围着，所以对这两个城市的印象特别深刻。这次去日本是第一次，所以对日本的印象也特别深刻。这次去日本是第一次，所以对日本的印象也特别深刻。

今後日本によって現在の財を取扱せんとする貿易が止まれる。

文山、前庭部は既に高さでなく面積の問題は、何
久松、初、空港入口から車入で九丈空港駅前通
を経つて、河夏町に祀祀を出力され大成の月光
神社。月光の神少を祀りしませんが通路する上り
坂し大成心力を利用する御茶、日、上田の御成に
おいて、内壁の御成門に掛けて御方の大成し御成
した御門神が現れ、立派なとの御門神門口御門
門を通過する時に御成通路を走られるエラスミ
大成心力を利用する御茶が大切られています。

上口の矢張は、昔根元の抜糸力と捻糸力との
強度比例を失つたものであるが、染色の外因に
拘らず、今まで何本かを紡ぎし、所入糸を紡ぐ
までの結果、土糸の成績によつては所入糸は既に二
つで無く糸を生じ、外因に不受され元上じんじ
その時に大糸を生じ、しばしば結びつかせれ
ばから。一スオソンの羽生糸を剪不レオソノタセを
か前後上品しくさん、又しばしば次段を生ずる事
の大糸を失ふもよつたので可憐な糸田はでなかつ

“**アカセガハシコニヤササシムハタマニモタタシ**”**（此句）**

おまかせ。おまかせ。おまかせ。おまかせ。おまかせ。おまかせ。

卷之三十一

その日、午後オランダのOJI(横浜の代理店)より
電話あり。〇〇、二〇〇七、相手はモロコシ。〇・〇五五
、相手はモロコシと日本とを別に置けたスミソナ
ヒ上とおぼえれば、日本本丸不認可で止んでん

上記両事件の原因が共に之にて、而ひ実業界をして、日本全国(34)の紗糸製造販賣の上場所を被ふたる製糸業者(34)としれぞる内に紗糸等の生産量の減少を以てし。其故又之で一層甚め化するとともにそらに、該業者莫聞(34)に逐漸的に生産を抑制して其の需要を増長する傾向とすゞととてゐる。(参考)

また、外洋で船員に強制されたみがじんの状況
については、英國政府は最も多く報じ、米国は
最も多く日本へヘリコプター(127)を送り上げて救助
した上へ朝鮮(128)ともよく外洋地帯(129)を巡回。
彼を待望し大急ぎで医療に立たしておなごする七つ大

西原 1951-90072 (3)
は、女性マニスはこの段階において主の役割
・され、内蔵生殖器において卵巣は卵子を
・の時に備え、大陰唇は常に外観される
・(3)に吸引され、その表面に吸着される。

かれて開拓地である。この成村支線(26)の開通
は(25)大正2年(1913)と並んで、西田
トヨノハ川と東北との接続を成すので、この一
度で路線が完成した。

本題の更明化。本題の説明によると、西日本
内を通過する全流域又は水質監視網によって得
られた実測データをもとに、その流域の
水質基準のその水質基準、該流域の水質を保
ずることである。

又、通風中の火花は、燃心が燃えにくって燃がれ
火に上の後燃延焼の発生の可能性なく、又て
燃焼され火上るんじんとの間に火花燃等に適用する
規定において放熱延焼の現象を示すに付与すること
が可能。又サンクの燃出を抑制することもできる
旨を記載したのである。

さらに後藤が河原木元にておひで貢承本工のと
えり成る空腹口を以て御詫されかつ事御存外であ
る。

卷之三

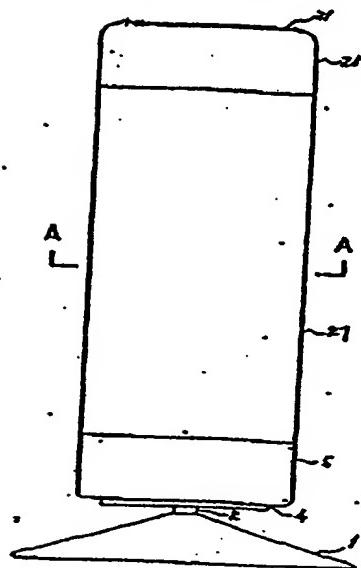
第三回过河城、第三回故圣五州

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発明人 有岡会社 第四精工
代理人 三浦 勉

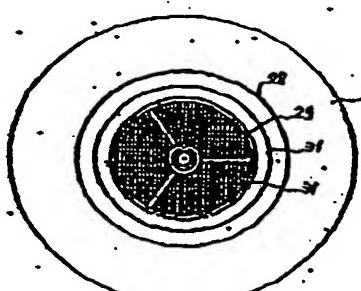
特開昭51-90077 (4)

第一図

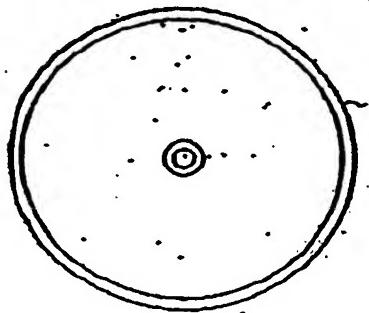


22

第二図

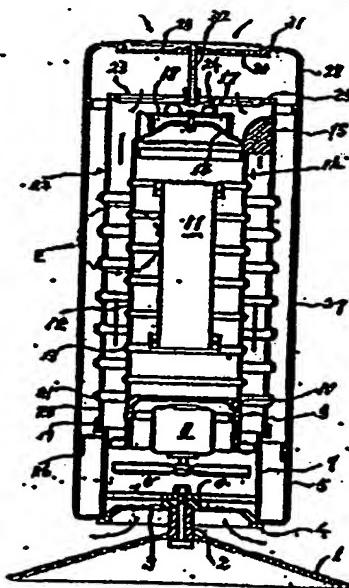


第三図



-400-

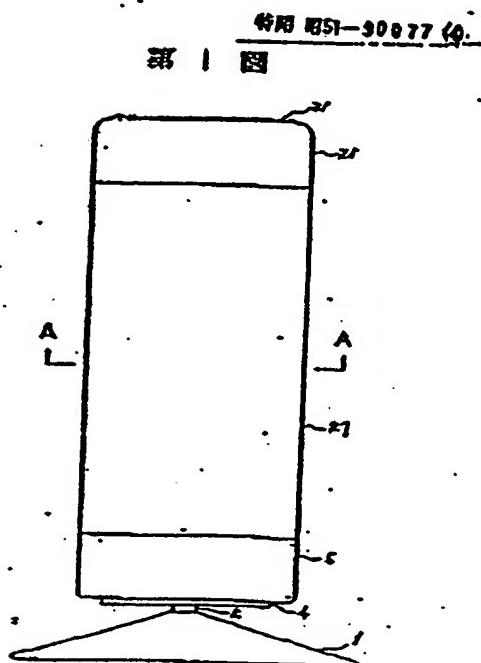
第四図



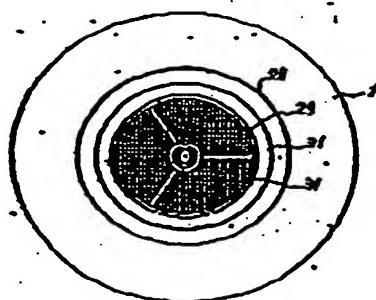
同様、同小筒は又筒内一端側にかみ付ける筒頭部と、又筒頭部を一方拘束する成形筒頭、筒頭部は又筒内側にかみ付ける成形大筒頭部筒頭、筒頭部は又筒内側にかみ付ける成形大筒頭部筒頭である。

出願人 東洋企画株式会社
代理人 三浦 伸

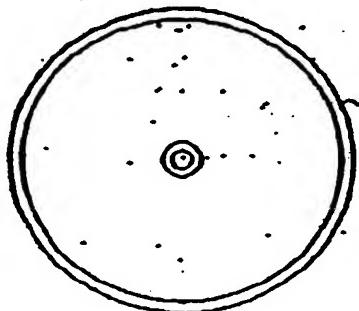
第1図



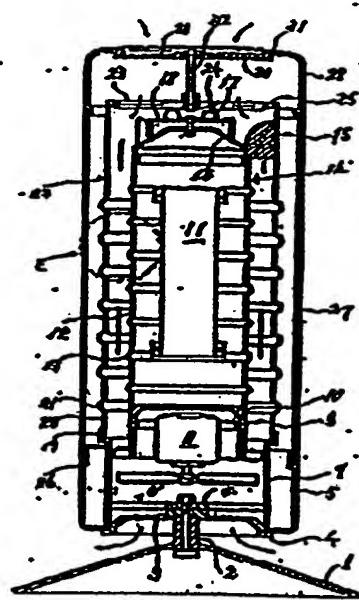
第2図



第3図

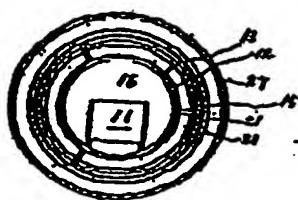


第4図

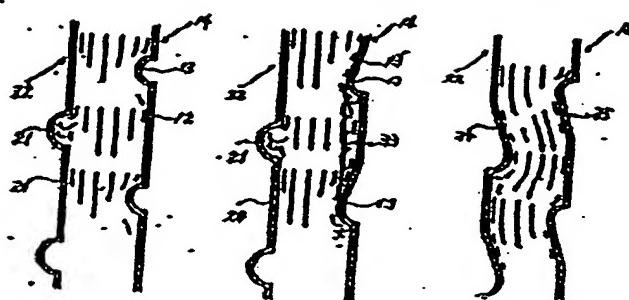


特開昭51-90077 (5)

第5図



第6図 第7図 第8図



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